

LEYPUNSKIY, A. I. et al

"Experimental studies of fast neutron reactor physics."

report presented at the 3rd Intl Conf, Peaceful Uses of Atomic Energy, Geneva,  
31 Aug-9 Sep 64.

KOSHKIN, Yu. N.; LEYPUNSKIY, A. I.

"Sodium cooled fast reactors."

report submitted for 3rd Intl Conf, Peaceful Uses of Atomic Energy, Geneva,  
31 Aug-9 Sep 64.

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AUTHORS: Leypunskiy, A. I.; Kazachkovskiy, O. D.; Afrikantov, I. I.;  
Pinkhasik, M. S.; Krasnoyarov, N. V.; Poydo, M. S.

TITLE: Sodium cooled fast reactors 19

SOURCE: Atomnaya energiya, v. 17, no. 5, 1964, 345-348

TOPIC TAGS: power reactor, liquid metal cooled reactor, fast reactor/BN-350

**ABSTRACT:** The first fast-neutron power reactor now being designed in the SSSR (BN-350) is described. It is rated 1000 MW thermal and 350 MW electrical. Sodium coolant at 300C (total volume 165 m<sup>3</sup>) is heated in the reactor to 500C by about 200 fuel elements. The volume of the active zone (~2000 liters) and the power ratio (500 kW/liter) ensure a minimum use of fuel in the cycle. The ratio of the diameter of the active zone to its height (D/H) is 1.4 (D = 1.5

Card 1 / 3

L 20049-65

ACCESSION NR: AP4049534

m, H = 1.06 m), the maximum sodium speed is 10 m/sec, the thickness of the breeder zones on the periphery and on the end is 60 cm. The construction permits the active zone size to be varied and to use different types of fuel elements. A ceramic fuel element is used consisting of a mixture of plutonium dioxide (19% Pu) and U<sup>238</sup>. Enriched (23%) uranium dioxide can also be used. The fuel rod is a stainless steel tube 5 mm in diameter and 0.4 mm thick, filled with pellets of the sintered fuel. The arrangement of the active and breeder zones is such as to produce a conversion ratio ~1.5. The internal conversion ratio is 0.62. The change in reactivity is 0.6% per month and is compensated by motion of central fuel elements with a reactivity margin of 1.4%, permitting 2 months' continuous operation. The shielding, control, and safety precautions are described. The sodium flows through a heat exchanger in which steam is produced at 430C and 50 atm pressure. Some improvements are suggested for future designs on the basis of the experience already gained in the design of the BN-350. Orig. art. has: 1 figure.

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ASSOCIATION: None

SUBMITTED: 00

ENCL: 00

SUB CODE: NP

NR REF SOV: 002

OTHER: 000

Card 3/3

L-1171-65 EWT(m)/EWA(h) Feb DIAAP  
ACCESSION NR AM5007588 BOOK EXPLOITATION

S/3143

U.S.S.R. Gosudarstvennyy komitet po ispol'zovaniyu atomnoy energii SSSR

Journal of the Information Center on Nuclear Data, no. 1 (Bulleten' Informatsionnogo tsentra po yadernym dannym, vyp. 1), Ed. by A. I. Leybunskiy and V. I. Monistat, 1983, 431 p. illus., biblio., tables. Errata printed on last page. 350 copies printed.

TOPIC TAGS: neutron interaction, nuclear reactor, radiation shielding, neutron cross section, neutron diffraction

TABLE OF CONTENTS [abridged]:

Foreword -- 3

Part 1. Parameters of elementary interactions of neutrons with nuclei -- 6

Part 2. Reactor constants -- 284

Part 3. Methodological problems -- 402

SUBMITTED: 0000064

SUB CODE: NP

NO REF SOV: 009

OTHER: 004

Card 1/1

L 5171-66 EPA(s)-2/ENT(m)/SPF(c)/SPF(n)-2/ENG(m)/T/EMP(t)/EMP(b) IJF(c)  
ACCESSION NR: AT5022451 JD/WW/JG/GS UR/0000/65/000/000/0001/0030

AUTHOR: Leypunskiy, A. I.; Kazachkovskiy, O. D.; Pinkhasik, M. S.;  
Krasnoyarov, N. V.; Bagdasarov, Yu. Ye.; Troyanov, M. F.; Milovidov,  
I. V.; Afrikantov, I. I.; Poydo, M. S. (Deceased); Stekol'nikov, V.V.

TITLE: BN-350 nuclear power plant

SOURCE: Obninsk. Fiziko-energeticheskii institut. Doklady, 1965.  
Atomnaya stantsiya BN-350, 1-30

TOPIC TAGS: nuclear power plant, liquid metal cooled reactor,  
fast reactor, nuclear reactor technology, desalination

ABSTRACT: After a brief discussion of the advantages of using fast  
neutron reactors for power production, a new 350 Mw fast neutron  
sodium cooled reactor of BN-350 type is described. At present, a  
power plant equipped with such reactors and P-50 back pressure steam  
turbines is under construction in the Mangyshlak peninsula area at  
the northeastern coast of the Caspian Sea. The dual-purpose plant  
will generate 150 Mw of electric power and produce 1200 ton/hr of

Card 1/4

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steam. The steam will be used by a desalting plant designed to supply 120,000 cu m of fresh water per day. It is expected that the power plant will be put into operation in 1968 or 1969. The primary and the secondary intermediate loops of the reactor will be cooled by liquid sodium. The third loop will be of steam-water type. The reactor core carries 211 hexagonal fuel assemblies each containing 169 uranium-dioxide elements. At the beginning, a compound of uranium-dioxide and plutonium will be used in fuel elements. There are 120 inner and 320 outer assemblies placed in concrete shields. The selected essential data on BN-350 reactor are as follows:

Thermal power	1000 Mw
Core Volume	1.87 cu m
Core diameter	1.495 m
Core height	1.06 m
Vessel diameter	6 m
Vessel height	2.2 m
Coolant temperature (inlet)	300 C
Coolant temperature (outlet)	500 C

Card 2/4



L 5171-66

ACCESSION NR: AT5022451

Many other details and data are given on reactor core and concrete shielding as well as on the reactor tank made of X18H9 stainless steel. A special chapter is devoted to the discussions of various control systems including power control, measurements, automatic regulation, reactivity compensation, and emergency protection. The replacement and handling of fuel elements is also discussed. The radiation shielding is briefly described. Some information is given on the selection of materials as well as on the experimental investigation of various control and safety systems. An extensive analysis of heat transfer system is also presented dealing with primary and secondary loops, heat exchanger, pumps, piping, emergency heat removal, steam generators and other equipment. In conclusion, some further possible improvements in the design and operation of fast neutron reactors are outlined including a more efficient burn-up of

Card 3/4

L 5171-66

ACCESSION NR: AT5022451

fuel elements, a further increase in temperature and an eventual use of fuel carbides instead of oxides. Orig. art. has: 2 tables and 6 figures.

ASSOCIATION: none

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NO REF SOV: 000

OTHER: 000

Card 4/4 *md*

ACCESSION NR: AP5012468

UR/0089/65/018/004/0342/0350 47

AUTHORS: Leypunskiy, A. I.; Kazachkovskiy, D. I.; Shikhov, S. B.; 40

TITLE: Study of the possibility of using thorium in fast power reactors 41

SOURCE: Atomnaya energiya, v. 18, no. 4, 1965, 342-350

TOPIC TAGS: fast reactor, breeder reactor, plutonium reactor, thorium reactor, nuclear fuel, fuel burnup

ABSTRACT: In view of the difficulties involved in large-scale economic use of  $U^{233}$  and thorium for nuclear power generation, the authors consider the use of these materials in conjunction with the more efficient  $Pu^{239}$ - $U^{233}$  combination. They show that the use of a mixed  $U^{233}$ - $U^{235}$  fuel cycle makes it possible to improve markedly the characteristics of thorium-fuel fast

Card 1/3

ACCESSION NR: AP5012468

reactors and to obtain a system with a fuel-doubling time which differs little from that of a pure plutonium reactor and is much shorter than that for uranium and thorium alone. In such a system the thorium is placed in the core and the  $U^{233}$ ,  $U^{238}$ , and  $Pu^{239}$  are placed in the reflector. The system is designed so that the burnup and breeding of  $U^{233}$  and  $Pu^{239}$  are such that the ratio remains constant. The characteristics are compared for both oxide and metallic fuel, using a liquid-sodium coolant at 3000 with a temperature drop of 230°C. Other parameters are also compared. The somewhat lower critical mass, mainly due to the presence of the  $U^{233}$  and  $Pu^{239}$  in the core, is noted. The authors recommend that the results be used for a useful discussion of the present results and A. N. Shmelev for the computer calculations." Orig. art. has: 4 figures, 14 formulas, and 2 tables.

Card 2/3

ACCESSION NR: AP5012468

ASSOCIATION: none

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ENCL: 00

SUB CODE: NP

NO REF SOV: 003

OTHER: 000

ATD PRESS: 4008

Card 3/3 *115*

ACC NR: AP7007582

SOURCE CODE: UR/0089/66/021/002/0084/0092

AUTHOR: Leypunskiy, A. I.; Kazachkovskiy, O. D.; Shikhov, S. B.; Yurova, L. N.; Kromov, V. V.; Shmelev, A. N.; Sukhoruchkin, V. K.

ORG: none

TITLE: Use of nonuranium dilutors of plutonium in large, fast breeder reactors  
SOURCE: Atomnaya energiya, v. 21, no. 2, 1966, 84-92

TOPIC TAGS: breeder reactor, fast reactor

SUB CODE: 18

ABSTRACT: The physical characteristics of fast breeder reactors with cylindrical and annular active zones have been studied, together with the characteristic of infinite lattices of large fuel elements located in a heterogeneous manner within the material of the breeder zone. The paper presents in tabular form the results of theoretical calculations, discusses the influence of  $Pu^{240}$  and  $Pu^{241}$ , describes the change in reactivity during the irradiation process, and shows the results of investigation of the sodium temperature coefficient and the Doppler temperature coefficient. An analysis of the results shows that the use of nonuranium dilutors of plutonium in large fast reactors (with a large active volume) results in annular active zones and zones with fuel elements within the breeder composition zones having peculiarities which make them more economical than large cylindrical active zones. The authors thank I. S. Slesarev, A. M. Kuz'min, M. F. Troyanov, and V. M. Marogor for their part in carrying out the research and O. N. Gerasimovaya for helping to compile information in the article. Orig. art. has: 2 figures, 3 formulas and 5 tables. [JPRS: 39,417]

Card 1/1

UDC: 621.039.526: 621.039.543.466

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2

Activated adsorption and its role in catalysis. O. LIFSHITZ AND S. ROGINSKI.  
*Physik. Z. Sowjetunion* 1, 693-4(1932).—Outline of proposed work. P. H. EMMETT

The steric factor in the equation for activated adsorption.  
 O. L. LIFSHITZ. *Compt. rend. acad. sci. U. R. S. S. 1*,  
 30-2(in German 22-4)(1935).—Activated adsorption is  
 characterized by an important steric factor which may  
 result from a diffusion process on the surface or in the lat-  
 tice of the adsorbent. L. B. Steiner

ASAC-55A METALLURGICAL LITERATURE CLASSIFICATION

APPROVED FOR RELEASE: Monday, July 31, 2000



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<p>Recombination of atomic hydrogen in adsorbed layers. O. I. LUTYUNSKI. (Acta Physico-chim. U.R.S.S., 1955, 5, 271-298).—The adsorption and recombination of H atoms on Ni, Fe, Cu, and Al between <math>-100^{\circ}</math> and <math>0^{\circ}</math> has been studied. An equation for the recombination velocity has been deduced assuming an activated surface diffusion of H, which is in good agreement with the results. Deviations are attributed to inhomogeneity of the surface. Metals which are most efficient as hydrogenation catalysts give the greatest recombination velocities. The energy of activation of the surface diffusion calc. from the temp. coeff. is <math>&lt;</math> that calc. from the abs. velocity of recombination owing to the operation of a steric factor, the nature of which is discussed. R. S.</p>																																							
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<p>983. Activated Adsorption of Hydrogen upon Smooth Nickel.  O. Leppanahy. <i>Acta Physicochimica</i>, 8. 6. pp. 807-812, 1936. In  <i>German</i>. A study has been made of the kinetics of the activated adsorption  of <math>H_2</math> on a smooth Ni surface at <math>-145^\circ C</math> and <math>-118^\circ C</math>, following the  experimental procedure of a previous publication [see Abstract 4928  (1936)]. At <math>-145^\circ C</math>, only 15 % of the gas was slowly adsorbed, and  thereby provided an opportunity for the kinetic investigation of the  process. The kinetic equation derived from Langmuir's theory of acti-  vated adsorption, indicated a satisfactory agreement with the experi-  mental curve. The heat of activation <math>E = 2060</math> cal., and the steric factor  <math>f = 2.2 \times 10^{-4}</math>, were determined from the constants of the equation. A  discrepancy was found between the number of accessible adsorption zones  as determined from the constants of the velocity equation and the actual  amount of gas absorbed. The latter is 2.4 times greater than the com-  puted value. H. H. Ho.</p>																			
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PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

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Recombination of atoms of hydrogen in an adsorbed layer. O. J. Leipunskii. *J. Phys. Chem.* (U. S. S. R.) 6, 418-47 (1966).—On Ni, Fe, Cu and Al at from  $-180^{\circ}$  to  $0^{\circ}$ , hydrogen is adsorbed up to 8 mol. layers. The amt. of at. H adsorbed at  $-180^{\circ}$  is practically independent of the amt. of mol. H, previously adsorbed or of the activity of the surface. The equation  $\theta = a/(1 + ka)$  for rate of recombination is derived on the assumption of diffusion and surface collision phenomena and is found to be verified by calcns. from the exptl. data. The more active the surface as adsorbent or catalyst, the more rapidly recombination occurs. The heat of activation as calcd. from the temp. coeff. is 2-4 Cal., while from the coeff. of the kinetic formula it is 10-17 Cal. Since the calcd. velocity recombination is 7-10 orders greater than the observed, the steric factor must be large.

F. H. Rathmann

ASTM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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<p><i>co</i></p> <p><b>Kinetics of the activated adsorption of hydrogen on a plane nickel surface.</b> U. Krieger, <i>J. Phys. Chem.</i> (U. S. A. N.) 6, 143 (1947). At <math>-145^{\circ}</math>, 85% of the total adsorption of <math>H_2</math> is practically instantaneous. The kinetics of the adsorption of the other 15% obeys the Langmuir equation for activated adsorption, with <math>E = 21000</math> cal, and a steric factor <math>f = 2.2 \times 10^{-4}</math>. The quantity of gas adsorbed is 2.4 times as great as corresponds to the no. of accessible sites <math>N = 1.31 \times 10^{19}</math> derived from the kinetic equation <math>k = 6.7 \times 10^{10} e^{-E/RT} / \sqrt{T}</math>. At <math>-115^{\circ}</math>, <math>k = 4.36 \times 10^{-3}</math> /sec. and at <math>-118^{\circ}</math>, <math>k = 10.7 \times 10^{-3}</math> /sec. F. H. Rothmann</p>																									
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<p>Displacement of the Curie point under the action of pressure. Q. J., Leipunskill. <i>J. Exptl. Theoret. Phys.</i> (U. S. S. R.) 8, 1026-30(1938).—On the basis of the Clapeyron equation the shift of the Curie point for Ni is given by <math>\Delta T = 6.3 \times 10^{-1} T \Delta p</math> atm. On the basis of Helmholtz's equation, <math>T = 2J/K</math>, L. obtains the equation <math>dT/dp = 1/2J(1/T) + 1/2J \Delta T</math>, from which for Ni, <math>\Delta T = 3.3 \times 10^{-1} T \Delta p</math>, and for Fe, <math>\Delta T = 4 \times 10^{-1} T \Delta p</math>. Expts. designed to find the shift in Curie point with pressure have not been performed under the proper conditions. The Curie points calcd. for Fe and Ni in the earth's center (between 3000 and 4250°K.) lie within the limits permitted.</p> <p>F. H. Rathmann</p>																			
<p>111 AND 112 COLUMNS</p> <p>113 AND 114 COLUMNS</p> <p>115 AND 116 COLUMNS</p> <p>117 AND 118 COLUMNS</p> <p>119 AND 120 COLUMNS</p> <p>121 AND 122 COLUMNS</p> <p>123 AND 124 COLUMNS</p> <p>125 AND 126 COLUMNS</p> <p>127 AND 128 COLUMNS</p> <p>129 AND 130 COLUMNS</p> <p>131 AND 132 COLUMNS</p> <p>133 AND 134 COLUMNS</p> <p>135 AND 136 COLUMNS</p> <p>137 AND 138 COLUMNS</p> <p>139 AND 140 COLUMNS</p> <p>141 AND 142 COLUMNS</p> <p>143 AND 144 COLUMNS</p> <p>145 AND 146 COLUMNS</p> <p>147 AND 148 COLUMNS</p> <p>149 AND 150 COLUMNS</p> <p>151 AND 152 COLUMNS</p> <p>153 AND 154 COLUMNS</p> <p>155 AND 156 COLUMNS</p> <p>157 AND 158 COLUMNS</p> <p>159 AND 160 COLUMNS</p> <p>161 AND 162 COLUMNS</p> <p>163 AND 164 COLUMNS</p> <p>165 AND 166 COLUMNS</p> <p>167 AND 168 COLUMNS</p> <p>169 AND 170 COLUMNS</p> <p>171 AND 172 COLUMNS</p> <p>173 AND 174 COLUMNS</p> <p>175 AND 176 COLUMNS</p> <p>177 AND 178 COLUMNS</p> <p>179 AND 180 COLUMNS</p> <p>181 AND 182 COLUMNS</p> <p>183 AND 184 COLUMNS</p> <p>185 AND 186 COLUMNS</p> <p>187 AND 188 COLUMNS</p> <p>189 AND 190 COLUMNS</p> <p>191 AND 192 COLUMNS</p> <p>193 AND 194 COLUMNS</p> <p>195 AND 196 COLUMNS</p> <p>197 AND 198 COLUMNS</p> <p>199 AND 200 COLUMNS</p>																			

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<p>ca</p> <p>synthetic diamonds. O. F. Lepenski. <i>Uspehi Khim.</i> 1919-24(1930).—Review of the literature and theoretical. The thermodynamics of crystal-diamond formation from dissolved carbon or from graphite or diamond powder at various temps. and pressures is discussed. P. H. R.</p>																			
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<p><b>Adsorption of a Gas Accompanied by Its Dissociation (Tungsten-Hydrogen System).</b> O. I. Leyppusky (<i>Acta Physicochim., U.R.S.S.</i>, 1939, 10, (4), 529-538). [In English]. If <math>\theta</math> and <math>\theta_m</math> are the fractions of surface covered by atoms and molecules respectively, considering the equilibrium state including the following processes, dissociation of the molecules (diatomic) and recombination of the atoms in the adsorbed layer, evaporation and adsorption of the molecules, but neglecting evaporation and adsorption of atoms, i.e. by restricting the consideration to not too high temp., when the evaporation of the atoms is of small account, as in the hydrogen-tungsten system at 1500° K., then:</p> $\theta_a = \frac{1}{1 + \sqrt{\frac{A}{B(B-1)}}} \quad \text{and} \quad \theta_m = \frac{1-\theta_a}{B}$ <p>where <math>A = 2e^{-D_d/RT}</math>, <math>B = \frac{1 + N\theta_m}{\mu}</math>, <math>N</math> is the number of places for adsorption per cm.<sup>2</sup> (about 10<sup>15</sup>), <math>\theta_m</math> is the probability that a molecule will evaporate and is equal to <math>10^{12} e^{-U_m/RT}</math>, <math>\mu</math> is the stream of molecules from the gas on to the surface, <math>D_d</math> is the heat of dissociation on the surface, and <math>U_m</math> is the heat of adsorption of a molecule. For high temp. or low pressure the expression reduces to Fowler's formula, and when the surface is sparsely covered, <math>\theta_m = 1/B</math>, which corresponds to Langmuir's adsorption isotherm. With increase of pressure the concentration of atoms in the adsorbed layer rises to a max. value, after which it begins to fall. The adsorption isotherms have very much the shape</p>																																																																																																																																																																																																											
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1. LEYPUNSKIY, O. I.

2. USSR (600)

"The Adsorbtion of a Dissociating Gas". Zhur. Fiz. Khim. 13. No. 3, 1939.  
Leningrad, Academy of Sci. USSR, Physioc-Chemical Laboratory. Received 14 Jan. 1939.

9. [REDACTED] Report U-1615, 3 Jan 1939.



1ST AND 2ND CIPHER										3RD AND 4TH CIPHER									
PROCESSES AND PROPERTIES INDEX																			
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<p>Decomposition of methanol under high pressures. A. Apin, O. Lel'puns'kil and N. Re'nov. <i>J. Gen. Chem.</i> (U. S. S. R.) 10, 803-5 (1940).—With the aim to investigate the influence of high pressures on simple reactions of org. compds. the behavior of MeOH has been investigated. The decompn. of MeOH was studied at 350° under pressures of 600, 2000, 6000 and 8000 atm. The reaction products were Me<sub>2</sub>O, CH<sub>4</sub>, CO<sub>2</sub>, CO and H<sub>2</sub>. Unsatd. hydrocarbons could not be detected. The amt. of Me<sub>2</sub>O increased with increasing pressure and decreased at a given pressure with prolonged reaction time. CO and H<sub>2</sub> were formed in small amts. and CH<sub>4</sub> in large amts. when high pressures were applied. The amt. of CO and H<sub>2</sub> increased with prolonged reaction time while the amt. of CH<sub>4</sub> decreased. The reaction vessel used consisted of nonrusting steel contg. about 8% CrO<sub>2</sub> which possibly acts as a catalyst. A series of reactions according to which the decompn. reaction is assumed to proceed is given.</p>																			
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PROCEDURES AND PROPERTIES INDEX																			
<p>4</p> <p>Coagulation of gelatin under pressure. O. J. Lepkowski, <i>J. Phys. Chem.</i> (U. S. S. R.) 14, 1817-19(1940).—The transition of sol to gel is accelerated by an increase of pressure. Viscosity measurements indicate that, at a pressure of 2000 atm., the initial coagulation is increased 2-2 1/2 times.</p> <p>B. C. P. A.</p>										<p>2</p>									
<p>ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION</p>																			
FROM SYMBOLS										FROM SYMBOLS									
1ST AND 2ND ORDER										1ST AND 2ND ORDER									
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LEIPUNSKII, O.I.

RT-1152 (The disintegration of uranium) Podil uranu.  
VISTI AKADEMII NAUK URSS, 14(1): 61-66, 1941.

1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

PROCESSING AND PROPERTY INDEX

2

CA

Behavior of thixotropic colloids under pressure. I. Gelation of hydrated iron oxide. O. I. Leimanovich and P. E. Frank. *J. Phys. Chem.* (U. S. S. R.) 18, 604-6 (1941).  
 —The rate of setting of thixotropic hydrated iron oxide gels is decreased by application of pressures of 8000 atm. The effect is especially marked for fresh gels in low concns. of electrolyte and is attributed to a change in the conditions of adsorption on the surfaces of the micelles.  
 F. H. Rathmann

ASB:SLA METALLURGICAL LITERATURE CLASSIFICATION

FROM DOWNEY

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*End*

*see p. 100, 101*

**Mutarotation of glucose under pressure.** V. K. Bobolev and O. I. Leipunski (*J. Phys. Chem. Russ.*, 1941, 15, 1104—1107).—The velocity <sup>of</sup> mutarotation of  $\alpha$ -glucose at 25° increases with pressure,  $p$ , 10-fold when  $p$  rises from 1 to 10,000 atm. The energy of activation is slightly reduced by pressure. J. J. H.

...and the

... ..

**Obtaining extremely high temperatures.** J. B. Zeklovitch and  
 O. I. Leipunski (*J. Physics, U.S.S.R.*, 1943, 7, 245).—A blunt-nosed  
 Al bullet, projected through Hg vapour at 2700–3000 m. per sec.  
 at atm. pressure and the b.p. of Hg, produces a temp. of 35,000–  
 43,000° K. in the shock wave in front of it. The luminescence  
 corresponding to the temp. produced has been photographed, as a  
 trace of the trajectory of the bullet, with an exposure of  $\sim 10^{-6}$  sec.

ASB-LLA METALLURGICAL LITERATURE CLASSIFICATION

127

CA

Obtaining extremely high temperatures. V. H. Zel'dovich and O. I. Lepunskii, *J. Exptl. Theoret. Phys.* (U. S. S. R.), 13, 181-2 (1913).—If vapors were compressed in a powerful shock wave by shooting into them high-speed projectiles. For projection of 2500 m/sec. the temps. obtained were approx. 30,000° K. for 3mm. m.; sec., 49,000° K. A diagram of the app. is shown. P. H. Rathmann

2

AS 8-36A METALLURGICAL LITERATURE CLASSIFICATION

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

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**Viscosity of compressed gases.** O. Leipunskii (*Acta Physicochim. U.R.S.S.*, 1943, 18, 172-182).—A series of calculations available in published data, Emswiler's formula directly and accurately the viscosity of pure gases at 1000 atm. for  $N_2$ ,  $H_2$ ,  $CO_2$  at 100°, and  $CO$ , and up to 300 atm. for  $H_2O$  at 370°, 600 atm. for  $CH_4$  at 25°, 30 atm. for  $NH_3$  at 80°, and 150 atm. for  $O_2$  at 50°. The formula describes the change of  $\eta$  of gas mixtures with pressure with fair accuracy if the const.  $b$  is taken as the mean of vals. for the components.

1. J. J.

24

CA

Temperature rise in the surface of burning explosives.  
 Z. I. Aristova and O. I. Leipunskij (Inst. Chem. Phys.,  
 Acad. Sci. U.S.S.R., Moscow). *J. Phys. Chem. (U.S.S.R.)* 20, 1301-7 (1946) (in Russian).—Combustion of  
 solid explosives takes place in two stages of which the first  
 is gasification and the second, reaction in the gas phase.  
 To estimate the heat liberation during gasification, burn-  
 ing nitrocellulose or nitroglycerin was rapidly extinguished  
 and immediately thereafter introduced in a calorimeter.  
 The heat content of a nitrocellulose surface was 2.5 ±  
 0.5 cal./sq. cm., and of a nitroglycerin surface 2.8-4.6  
 cal./sq. cm. A thermocouple pressed against the surface  
 of nitroglycerin showed 320°. The temp. of the nitro-  
 cellulose surface was calcd. to be 250°. The heat capacity,  
 heat cond., and the rate of combustion of the specimens  
 used were measured.  
 J. J. Bikerman

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SSG-35A METALLURGICAL LITERATURE CLASSIFICATION

B. Gbs.

B1-7 Explosives, Matches

surface heating of burning powder. Z. I. Aristova and O. I. Leimanovskiy (Compt. rend. Acad. Sci. U.R.S.S., 1946, 64, 803-808).  
—The thermal energy in the heated-up layers of burning pyroxylin powder and nitroglycerin powder, measured calorimetrically, were 2.55 and 3.52 cal. per sq. cm. respectively. From these results, the surface temp. were calc. to be  $\sim 250^\circ$  and  $330^\circ$ , respectively. By an independent method based on the kinetics of the decomposition of nitrocellulose, the val.,  $\sim 300^\circ$ , was obtained. F. J. G.

LEYPUNSKIY, O. I.

✓ Discovery of short-life isomers. P. A. Yampol'skiy, O. I. Lelounskiy, M. Ya. Gen, and A. M. Tikhomirov. Izvest. Akad. Nauk S.S.S.R., Ser. Fiz. 19, 238-43 (1955).—A current of deuterons of 10 ma. at a voltage of 150 kv. bombarded a Zr target satd. with T producing 14-m.e.v. neutrons. The  $\gamma$ -radiation of the target was picked up by a scintillation counter with an org. crystal.  $\gamma$ -Rays were discovered with half-lives of 0.45-1.5 millise., 5.5 millise., 27-30 millise., and 3-4 sec.  $\gamma$ -Rays corresponding to short life isomers were also observed on bombarding targets of Pb and Bi with 14.7-m.e.v. neutrons. This  $\gamma$ -radiation was attributed to  $Pb^{203}$  and  $Bi^{205}$ . S. Pakswar

MEY (3)

LEJPUNSKIY, O.I.

SUBJECT USSR / PHYSICS CARD 1 / 2 PA - 1472  
 AUTHOR LEJPUNSKIY, O.I., MILLER, V.V., MOROZOV, A.M., JAMPOL'SKIY, P.A.  
 TITLE The Isomers with Short Period obtained by Proton Bombardment.  
 PERIODICAL Dokl. Akad. Nauk, 109, fasc. 5, 935-937 (1956)  
 Issued: 10 / 1956 reviewed: 11 / 1956

The present work forms part of the general program of research concerning the discovery of short-lived isomers created on the occasion of nuclear reactions. Here the nuclei were excited by an impulselike bundle of 20 MeV protons. The targets of substances to be examined were located in a vacuum at an angle of  $45^\circ$  with respect to the bundle. Short-period  $\gamma$ -radiation occurring as a result of proton bombardment was recorded by means of a scintillation counter and  $\beta$ -radiation was recorded by means of a counter with a stilb-crystal. The impulses of the counters were amplified and discriminated by means of an integral amplitude analyzer, after which they impinged upon the screen of a special cathode oscillograph with "standing" development, and were then photographed. On the occasion of the irradiation of Be a noticeable  $\beta$ -activity was noticed with  $T_{1/2} = 0,85 \pm 0,15$  sec. This activity may be ascribed to the  $Li^8$  ( $T_{1/2} = 0,87 \pm 0,02$  sec) created on the occasion of the reaction  $Be^9(p, 2p)Li^8$ . The threshold of this reaction computed from the masses is 18,7 MeV. In the course of further tests new  $\gamma$ -activities, which had formerly not been noticed, were found, which belong to hitherto unknown isotopes. The characteristics of these  $\gamma$ -activities are shown in a table. Apart from half lives, the estimated yields of these  $\gamma$ -activities are given. The elements concerned are Ti, Cd, Ta, Tl, Pb, Bi. Also on the occasion

INSTITUTION: Institute for Chemical Physics of the Academy of Science in the USSR.

Leypunskiy, O.I.

**AUTHOR:** LEYPUNSKIY, O.I., SAKHAROV, V.N., TERESHCHENKO, V.I. PA - 2312  
**TITLE:** The Short-Period  $\gamma$ -Radiation of the Fission Products of  $U^{235}$  and  $Pu^{239}$ . (Korotko-periodnoye  $\gamma$ -izlucheniye produktov deleniya  $U^{235}$  i  $Pu^{239}$ , Russian).  
**PERIODICAL:** Atomnaya Energiya, 1957, Vol 2, Nr 3, pp 278 - 279 (U.S.S.R.).  
 Received: 4 / 1957 Reviewed: 5 / 1957  
**ABSTRACT:** The present report gives the data found by the authors in 1953 on the spectral composition of the  $\gamma$ -radiation of the fission products of  $U^{235}$  within the time interval of 1,5 - 5 sec after fissioning. Besides, the authors deal with some conclusions drawn as to the decrease of the  $\gamma$ -activity of the fission products of  $U^{235}$  and  $U^{239}$  within the same time interval. The hardness of  $\gamma$ -radiation was determined by absorption of a collimated radiation bundle in matter. Irradiation lasted about 1 second and measuring began about 0,6 sec after the end of the irradiation. The measuring device consisted of lead collimators, a lead- or aluminium absorber, and of a steel counter SGS 400 in a glass balloon. The pulses of the counter were recorded on a film by means of a loop oscillograph.  
 From the measuring results firstly the law of the attenuation of the bundle of  $\gamma$ -rays on the occasion of the passage through matter, and secondly the law of the decrease of  $\gamma$ -activity with time can

Card 1/3

The average energy of  $\gamma$ -rays is constant or only little variable. A diagram containing a logarithmic abscissa and a logarithmic ordinate illustrates the law of the decrease of  $U^{235}$  under  $\gamma$ -activity after an instantaneous irradiation). This law is described satisfactorily within the time interval of from 1,25 to 17 sec after fission by a dependence of the type

$$t_{\text{sec}}^{-0,8} \pm 6 \%$$

Also the kinetics of the decrease of the  $\gamma$ -activity of the fission fragments of  $Pu^{239}$  satisfy the same dependence:

$$t_{\text{sec}}^{-0,8} \pm 8 \%, \text{ i.e. the kinetics of the decrease of } \gamma\text{-activity agree}$$

Card 2/3

**ASSOCIATION:** Not given.  
**PRESENTED BY:**  
**SUBMITTED:** 23.11.1956.  
**AVAILABLE:** Library of Congress.

Card 3/3

89-12-7/29

AUTHOR: Leypunskiy, O. I.,

TITLE: The Radioactive Hazards from the Explosion of a Hydrogen Bomb and an Ordinary Atomic Bomb (Radioaktivnaya opasnost' vzryvov chistovodorodnoy bomby i obychnoy atomnoy bomby)

PERIODICAL: Atomnaya Energiya, 1957, Vol. 3, Nr 12, pp. 530-539 (USSR)

ABSTRACT: The hazards for the total population of the earth, which are caused by the long-lived fission products that after the explosion of an ordinary atomic bomb or a hydrogen bomb respectively have scattered all over the world, are estimated. As hydrogen bomb the deuterium-tritium bomb is assumed. The doses of irradiation on the body are computed and accordingly the number of afterwards developping sickness, especially leukemia (blood cancer), is estimated. In the case of the hydrogen bomb C<sup>14</sup> and H<sup>3</sup> have an especially intensive effect, whereas in the case of the normal atomic bomb Sr<sup>90</sup>, Cs<sup>137</sup> and C<sup>14</sup> are the most dangerous isotopes. The total decay energy of the fission products originating from the hydrogen bomb is about three times higher than that of the normal atomic bomb. The main irradiation doses and the fatal losses of human lives during the decay time of the radioactive isotopes are approximately equally high for both kinds of bombs, if

Card 1/2



**AUTHOR:** LEYPUNSKIY, O.I., MOROZOV, A.M., MAKAROV, YU.V. PA - 2705  
**TITLE:** YAMPOL'SKIY, P.A.  
 New Short-Lived Isomeres within the Millisecond Domain.  
 (Novyye korotkoperiodnyye izomery v millisekundnoy oblasti, Russian)  
**PERIODICAL:** Zhurnal Eksperim. i Teoret. Fiziki, 1957, Vol 32, Nr 2,  
 pp 393-394 (U.S.S.R.)  
 Received: 5 / 1957 Reviewed: 7 / 1957

**ABSTRACT:** The authors investigated such isomeric states as occur on the occasion of reactions with 20 MeV protons. Data on new isomeric activities of some elements were determined recently. The method used for the investigation of these short-lived activities were described in a previous work (O.I. LEYPUNSKIY et al., Doklady Akademii Nauk, 1956, Vol 109, Nr 935). In the case of the measurements described here the energy of  $\gamma$ -radiation was determined by means of a photomultiplier FEU-19 with NaJ(Tl) crystals and a one-channelled differential discriminator. Also the control tests are mentioned.  
 A table contains the half-value periods found here and the values of the energy of  $\gamma$ -radiation of the newly discovered activities. The half-value periods found on the occasion of control tests with different compounds of the same element agree well among

Card 1/2

*LEYPUNSKIY, O. I.*

AUTHOR: Leypunskiy, O. I.

89-18/29

TITLE: On the Dangers of Radioactivity in the Case of a Continuation of Tests Carried Out With Atomic Bombs (O radioaktivnoy opasnosti nepreryvnykh ispytaniy atomnykh bomb).

PERIODICAL: Atomnaya Energiya, 1958, Vol. 4, Nr 1, pp. 63-70 (USSR).

ABSTRACT: On the assumption that every year atomic bombs with an equivalent of 11 million tons TNT (trinitrotoluene) are exploded for test purposes, the dangerous nature of radioactive precipitation falling on to the earth is evaluated.

The  $Sr^{90}$  - concentration in bones, the number of persons afflicted with cancer of the blood, and the number of persons having suffered genetic damage is calculated. Calculations show that approximately in the year 2000 the Sr concentration in vertebral bones will have by far exceeded the hitherto assumed permissible dose with a very large part of the human race. In every following year in which the aforementioned number of atomic bombs explosions will take place, 44.000 persons will suffer genetical damage, and 29.000 persons will be afflicted with cancer of the blood.

Card 1/2 There are 3 tables, and 5 references, 2 of which are Slavic.

*Submitted: Nov 1957*

AUTHOR: Leypunskiy, O.I., Reviewer

SOV/ 89-4-6-28/30

TITLE: On the Book by E.Teller and A.L.Latter, "Our Nuclear Future"  
(O knige E.Tellera i A.Lyattera "Nashe yadernoye budushcheye")

PERIODICAL: Atomnaya energiya, 1958, Vol. 4, Nr 6, pp. 608-610 (USSR)

ABSTRACT: The chapters dealing with nuclear physics are clear, simple, and concise. The chapters dealing with the dangers connected with radioactivity are written in a tendentious manner. Besides, the conclusions drawn e.g. with respect to the influence exercised by fluctuations are of a doubtful character. Furthermore, the authors' prognoses with respect to contaminations to be expected as a result of further atomic tests are far too low. Moreover, the authors are of the opinion that there are other diseases and conditions that cause more loss of life than tests carried out with atomic bombs. To use this as an argument in favor of continuing the practice of atomic bomb tests is both dangerous and unjustifiable.

The authors seemed to be scared of their own courage and continue by saying that "there exist many specifically political and military reasons which make it necessary to carry out further

Card 1/2

On the Book by E.Teller and A.Satter "Our Nuclear Future" 30V/89-4-6-28/30

A-bomb tests", and this is the real core of the matter. Any attempt at justifying further A-bomb tests by describing them as being necessary in the interest of science must be rejected on principle. There are 4 references, 3 of which are Soviet.

1. Atomic bomb tests--Effectiveness

Card 2/2

21(8)

PHASE I BOOK EXPLOITATION

SOV/2797

Leypunskiy, Ovsey Il'ich

Gamma-izlucheniye atomnogo vzryva (Gamma Radiation From an Atomic Explosion) Moscow, Atomizdat, 1959. 154 p. Errata slip inserted. 7,000 copies printed.

Ed.: Z.D. Andreyenko; Tech. Ed.: Ye. I. Mazel'.

**PURPOSE:** This book is intended for physicists, chemists, and chemical engineers concerned with problems of gamma radiation.

**COVERAGE:** The book deals with the effect of gamma radiation emitted in atomic explosions. The dosage of gamma radiation and the analysis of factors affecting it are discussed at some length. The effect of shock waves on the propagation of gamma rays observed by the author and Ya.B. Zel'dovich is said to be a new aspect of the theory of diffusion of gamma quanta. The author thanks Ya. B. Zel'dovich, V.N. Sakharov, P.A. Yampol'skiy, M. Ya. Gen, N. Ya. Buben, B.V. Novozhilov, V.I. Kolesnikov-Svinarev, V.I. Tereshchenko,

Card 1/4

Gamma Radiation From an Atomic Explosion

SOV/2797

7.	Propagation of gamma radiation from a point source in a homogeneous infinite medium	48
8.	Dose rate of gamma radiation in air over a ground surface area covered with gamma radiation sources	66
9.	Dose rate of gamma radiation over a plane layer of absorbent which contains gamma radiation sources	70
10.	Attenuation of a parallel beam of gamma rays in a plane layer of absorbent	76
11.	Albedo of gamma radiation	80
Ch. III. Gamma Radiation Dose From an Atomic Explosion		
12.	Intensity of fission fragment gamma radiation from an atomic explosion. Effect of the shock wave	86
13.	Intensity of short period gamma radiation. Total dose rate	101
14.	Gamma radiation dose. Hard component	104
15.	Gamma radiation dose. Fission-fragment component. Total dose	106

Card 3/4

Gamma Radiation From an Atomic Explosion

SOV/2797

16. Retention time of gamma radiation dose. Relationship of the doses of the fission fragment and the hard components	116
17. Comments on the calculation of gamma radiation dose in protective installations	120
Bibliography	122
Appendix I. Gamma Radiation From Fission Fragments	123
Appendix II. Supplementary Information on the Transmission of Gamma Radiation Through Matter	145

AVAILABLE: Library of Congress

Card 4/4

TM/bg  
1-19-60

21(3), 21(6)

SOV/89-6-1-6/33

AUTHOR:

Leypunskiy, O. I.

TITLE:

$\gamma$ -Rays in a Nuclear Explosion (Gamma-luchi pri atomnom vzryve)

PERIODICAL:

Atomnaya energiya, 1959, Vol 6, Nr 1, pp 49-56 (USSR)

ABSTRACT:

The  $\gamma$ -dose of a nuclear explosion depends not only on the number of radiated  $\gamma$ -quanta, but also on the shock wave occurring in the explosion. This shock wave causes a different kind of density distribution in the air, which leads to a decrease of  $\gamma$ -absorption. Therefore, the  $\gamma$ -dose is, on the other hand, increased.

The shock wave forms a cavity in the air, in which there is no absorption of  $\gamma$ -rays. The dimensions of these cavities increase with increasing explosion energy. Therefore, the  $\gamma$ -dose does not increase in proportion with energy in a certain distance from the explosion center when energy increases, but more rapidly. The increase of the dose caused by the shock wave may amount to several orders of magnitude.

The  $\gamma$ -dose produced by a nuclear explosion can be determined from the formula

Card 1/3



$\gamma$ -rays in a Nuclear Explosion

007/89-6-1-6/33

$$D = 2.6 \cdot 10^9 E_{\text{TNT}}^{0.4} \sqrt[3]{E_{\text{TNT}}} \cdot e^{-R/252} \cdot \frac{1}{R^2} [r],$$

where  $E_{\text{TNT}}$  denotes the explosion energy expressed in 1 000 t trotyl (TNT), and  $R$  - the distance from the explosion center.

If this formula is applied e.g. to the Hiroshima explosion, such conditions as were actually measured are found.

Besides the radiation originating from the fission fragments a  $\gamma$ -radiation is produced that is caused by the neutron capture of the nitrogen nucleus.

As a result of the superposition of the natural intensity decrease of the increase of  $\gamma$ -transmissivity of air (as a result of cavity formation) the dose power curve has a minimum and a maximum.

A principal component of  $\gamma$ -radiation which influences the explosion dose is a hard component with an energy of  $\sim 6$  MeV.

As, however, this component is of the same energy as the  $\gamma$ -capture quanta, the dose for the hard component can be calculated from the following formula:

$$D_{\text{hard}} = 4.6 \cdot 10^8 E_{\text{TNT}} \cdot \frac{e^{-R/410}}{R^2} [r]$$

Card 2/3

$\gamma$ -Rays in a Nuclear Explosion

SOV/89-6-1-6/33

Also in this case satisfactory agreement with the values measured at Hiroshima can be found.

Ya. B. Zel'dovich, P. A. Yampol'skiy, and V. N. Sakharov took part in this work as advisers.

There are 3 figures, 2 tables, and 14 references, 5 of which are Soviet.

Card 3/3

21(2), 21(3)

AUTHORS:

Leypunskiy, O. I., Sakharov, V. N.

SOV/89-6-5-24/33

TITLE:

The Propagation of the Radiation of  $\text{Co}^{60}$  in the Air Above the Earth (Rasprostraneniye izlucheniya  $\text{Co}^{60}$  v vozdukh nad zemley)

PERIODICAL:

Atomnaya energiya, 1959, Vol 6, Nr 5, pp 585-587 (USSR)

ABSTRACT:

The decrease of the intensity of  $\text{Co}^{60}$   $\gamma$ -radiation in the air above the earth in distances of from 1 to 800 m from the source is experimentally determined. The  $\gamma$ -source and the detector were in a height of  $\sim 0.7$  m above ground. The sources had an intensity of  $\sim 500$  C, 10 C, 1 C, 10 mC, 1 mC. An ionization chamber with "air-equivalent walls" and a special tube counter (Ref 1) were used as  $\gamma$ -detector. The measuring head consisted of three  $\gamma$ -detectors which were arranged perpendicular to one another. Owing to this arrangement the sensitivity of the detectors was independent of intensity in all directions up to 5 %. The experimentally found independence of a coefficient k of the distance between source and detector is shown by a graph. The coefficient k shows the rate at which radiation intensity decreases as a result of interaction of radiation with the air and the earth at  $0^\circ$  C and 740 torr air pressure. These data are compared with those obtained from

Card 1/3

The Propagation of the Radiation of  $\text{Co}^{60}$  in the Air  
Above the Earth

SOV/89-6-5-24/33

other publications. At distances of some tens of meters between the source and the detector radiation intensity increases as a result of interaction between radiation and matter. At large distances the measured intensities are lower by the 1.7 to 1.8-fold than those calculated theoretically. This confirms the opinion expressed by the authors of this paper that the dose originating from a punctiform source located on the earth must in great heights above the earth be about half of that of a source located at the same distance in a completely homogeneous medium. The results obtained may partly also be used for the purpose of determining radiation intensity above the surface of the earth if the latter is contaminated by radioactive precipitations. This task is performed by numerical integration by considering surface contamination to be the sum of point sources. In the case of a certain uniformly distributed radioactive contamination in a height of 1 m above the earth (covering density  $\sigma$  in  $\text{Mev/cm}^2.\text{sec}$ ), intensity is calculated within a compass having the radius  $R$  by means of the formula

Card 2/3

The Propagation of the Radiation of Co<sup>60</sup> in the Air      SOV/89-6-5-24/33  
Above the Earth

$J = A \cdot \sigma$  [Mev/cm<sup>2</sup>.sec]. For a  $\gamma$ -contamination of the intensity  $J$  the A-values for distances of 25, 50, 100, 200, 500 m and  $\infty$  are tabulated. There are 1 figure, 1 table, and 5 references, 2 of which are Soviet.

SUBMITTED:      December 12, 1958

Card 3/3

PHASE I BOOK EXPLOITATION

SOV/5065

Leypunskiy, Ovsy Il'ich, Boris Vasil'yevich Novozhilov, and Vsevolod Nikolayevich Sakharov

Rasprostraneniye gamma-kvantov v veshchestve (Propagation of Gamma-Ray Quanta in Matter) Moscow, Fizmatgiz, 1960. 207 p. 6,000 copies printed.

Ed.: Margulis, U. Ya; Tech. Ed.: Murashova, N. Ya.

**PURPOSE:** This book is intended for physicists, engineers, and advanced students concerned with the applications of nuclear physics in industry, as well as with the applications of radio isotopes.

**COVERAGE:** The book discusses the theory of  $\gamma$ -quanta propagation and absorption in matter, taking into account the multiple scattering of quanta. It gives the quantitative characteristics (calculated and experimental) of  $\gamma$ -rays for the various representative cases of radiation propagation: propagation in an infinite medium, passage through a layer of finite thickness, reflection from the boundary surface (albedo), etc. Data are given on the attenuation, and the spectral and angular distribution of  $\gamma$ -radiation.

Card 1/4

5(4) 5.1300(A)

68346

AUTHOR: Leypunskiy, O. I. (Moscow)

S/076/60/034/01/028/044  
B010/B014

TITLE: Pressure Dependence of the Combustion Rate of Black Powder

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol 34, Nr 1, pp 177-181 (USSR)

ABSTRACT: In the present paper the author studied the pressure dependence of the combustion rate of black powder. A physical theory for the combustion of smokeless powder was elaborated by Ya.B. Zel'dovich (Ref 1), which is based upon A. F. Belyayev's (Ref 2) concept of the combustion of volatile, liquid explosives in the vapor phase. Though this is a similar process, it is not possible without any difficulty to apply Zel'dovich's theory to black powder because of the different nature of the substances. It is assumed that, when the powder burns, a dispersion takes place which was observed for the first time by N. F. Pokhil. A gas - coal mixture is formed from gases discharged by the decomposing saltpeter. The coal particles are burned in the current of this mixture. Pressure has no influence on the duration of combustion of these particles. The pressure dependence of the combustion rate is, however, similar to Ya. B.

Card 1/2

LEYPUNSKIY, O.I.

Possible magnetic effect in high-altitude explosions of atomic  
bombs. Zhur. eksp. i teor. fiz. 38 no.1:302-304 Jan '60.

(MIRA 14:9)

(Magnetic fields) (Atomic bomb--Testing)



LEYPUNSKIY, Ovsey Il'ich

Gamma radiation of an atomic explosion. New York, USJPRS, 1961.  
xii, 155 p. diagrs., graphs, tables. (AEC-tr-4516 Physics.  
Translation Series)

On cover: United States Atomic Energy Commission.  
Division of Technical Information.

Translated from the original Russian: Gamma--izlucheniye atomnogo  
vzryva, Moscow, 1959.

22877

S/089/61/010/005/005/015  
B102/B214

26.2246

AUTHORS: Leypunskiy, O. I., Strelkov, A. S., Frolov, A. S.,  
Chentsov, N. N.

TITLE: The propagation of the  $\gamma$ -radiation of a prompt point source  
in air

PERIODICAL: Atomnaya energiya, v. 10, no. 5, 1961, 493-500

TEXT: The present paper gives a calculation of the propagation of an infinitely short gamma radiation pulse ( $\delta$  pulse) in air space considered as infinite. The calculation is made by the Monte-Carlo method. The initial gamma radiation energy is assumed to be 1 Mev and the density of air to be  $1.29 \cdot 10^{-3} \text{ g/cm}^3$ . The point source considered emits isotropically. The direction of motion of one of the quanta emitted by the source and suffering collision is described by the Klein Nishina indicatrix. A special method is developed for the solution of the transcendental equation obtained. The absorption of the quanta is taken into account by a weight factor. A quantum packet thus moves along a trajectory; each trajectory is followed till the weight is only just  $10^{-4}$  times the initial weight. X

Card 1/5

22877

S/089/61/010/005/005/015

B102/B214

The propagation of the  $\gamma$ -radiation of a...

The object of the calculations is to determine the quantity  $\Phi_{kjm}$  i.e. the energy transferred at a distance  $R_k$  from the source in the time  $t_j - t_{j+1}$  through a unit area perpendicular to the flux by gamma quanta of energy  $E_i - E_{i+1}$  whose directions of motion make an angle  $\theta_m - \theta_{m+1}$  with the radius vector of the point of observation. The intensities  $I_{kjm}^0 = \Phi_{kjm} / \Delta t_j \Delta E_i \Delta \Omega_m$  can be determined from  $\Phi_{kjm}$ . The following numerical values are taken as the basis of the calculations: 1)  $R_k = 250, 500, \text{ and } 1000 \text{ m}$  corresponding to  $\mu_0 R_k = 2.03, 4.08, \text{ and } 8.12$  free paths; 2)  $t_j = 0, 0.125, 0.250, 0.500, 1.00, 1.50, 2.00, 3.00, 4.00, \infty \mu\text{sec}$ ; 3)  $E_i = 0, 0.0625, 0.125, 0.250, 0.500, 1.00 \text{ and } 2.00 \text{ Mev}$ ; 4)  $\theta_m = 0, 10, 40, 90, 180^\circ$ . The applicability of the method was checked by comparison of the build-up factors obtained by integration of  $I_{kjm}^0$ . The result is

Card 2/5

22877

S/089/61/010/005/005/015  
B102/B214

The propagation of the  $\gamma$ -radiation of a...

$R_k, m (\mu_o R_k)$	250 (2.03)	500 (4.06)	1000 (8.12)
Monte-Carlo method	3.69	7.57	21.8
method Ref. 6	3.6	7.5	18.6

(Ref. 6: H. Goldstein, J. Wilkins. Rept. U. S. Atomic Energy Comm., No. 40, 3075 (1955)). The investigation of the time dependence of the pulse of the gamma source (scattered quanta) for observation points at different distances showed that the pulse became broader with increasing distance. The duration of the decrease of energy amounts to 0.5, 1.0, and 1.5  $\mu$ sec, respectively, for  $R = 250, 500$ , and  $1000$  m. The unit of intensity is taken to be the intensity during  $0 - 0.125 \mu$ sec. The absolute values of the intensity in this interval over the whole spherical surface for these three  $R$  values are 1.43, 0.41, and  $0.0088$  Mev/ $\mu$ sec, respectively. The investigation of the time energy spectra for different distances showed that for a given time interval at  $R > 250$  m the form of the spectra remain practically unchanged. The investigation of the time dependence of the energy for different  $R$  values showed that for  $t > 1-1.5 \mu$ sec the mean hardness of the radiation remains practically unchanged (50-60 kev). From

Card 3/5

22877

S/089/61/010/005/005/015  
B102/B214

The propagation of the  $\gamma$ -radiation of a...

a comparison of the  $I(t)$  curves in given solid angles for different  $R$  values it is found that the decrease of intensity at  $\theta < 90^\circ$  is delayed with increasing distance. With increasing  $t$  and  $\theta$  and a given  $R_k$  the spectra become softer. Table 2 gives the numerical data for the angle distribution of the scattered gamma radiation; Table 3 gives the same for the total intensity. An estimate of the accuracy of the calculation of the time dependence of the intensities gives for  $t = 1 \mu\text{sec}$  15-20 %, and for  $t > 1 \mu\text{sec}$  40-50 %. For the time dependence of the energies the situation is analogous. The authors thank I. M. Gel'fand for collaboration. There are 6 figures, 3 tables and 8 references: 6 Soviet-bloc and 2 non-Soviet-bloc. X

SUBMITTED: July 7, 1961

Legend to the Tables: 1)  $\theta$  in degrees, 2)  $R$  in meters; the intensities are given in %.

Card 4/5

S/796/62/000/003/010/019

AUTHOR: Leypunskiy, O.I.

TITLE: Fast-neutral-dose measurement. (A brief survey.)

SOURCE: Moscow. Inzhenerno-fizicheskiy institut. Pribory i metody analiza izlucheniya. no.3. 1962, 97-104.

TEXT: Thermal-neutron-dose measurement (at energies below the 0.4-ev absorption threshold of the Cd filter) is usually performed separately from fast-neutron-dose measurement (above 1 mev); Measurement of neutrons of intermediate energy is inhibited by lack of suitable instrumentation. The resulting underestimation of the total neutron dose may be extremely significant in some circumstances, both physically and biologically. The primary difficulty in measuring neutron doses is a lack of correlation between tissue ionization and direct biological effect, as that obtaining in the instance of  $\gamma$ -rays. A relative biological effectiveness (RBE) must be introduced, a factor further complicated by the dependence of the effective RBE not only on the protons but also on the  $\gamma$ -rays (from thermal-neutron capture), the contribution of which depends on the neutron energy. It is, therefore, necessary to measure separately the doses attributable to  $\gamma$ -radiation and to neutrons. V.I. Ivanov's proportional sensor (In Sbornik rabot po nekotorym voprosam dozimetrii i radiometrii. Ed. by Yu.V. Sivintsev, No.2. Moscow. Atomizdat, 1960) is critically reviewed. It fails to measure the intermediate-energy neutrons. The Monte Carlo

Card 1/2

Fast-neutral-dose measurement. ...

S/796/62/000/003/010/019

techniques outlined by N.Snyder, et al. (Brit.J.Radiol., v.28, 1955, 330, 342) and A.M.Kogan, et al. (Atomnaya energiya, v.7, 1959, 351) specify instrument characteristics which may be met by dosimeters designed according to reasonings expounded by Panger, Roesch (Nucl.Instr.Meth., v.5, 1959, 2) and A.M.Kogan, et al. (Atomnaya energiya, v.4, 1959, 386), namely, that a depth (15 cm) exists in a paraffine block at which the concentration of thermal neutrons is independent of the energy of the impinging neutrons. A device with a thermal-neutron indicator buried at such a depth in a paraffine block probably is used in the American individual under-arm dosimeter (Karp, J., Rev.Sci.Instr., no.10, 1957). An assessment of the dose of neutrons of intermediate energy appears possible with the aid of resonance indicators by the method of Boron filters. The total dose of the neutrons is obtained by adding the intermediate-energy neutron dose thus measured to the dose measured by a threshold dosimeter. There are 2 figures and 9 references (4 Russian-language Soviet and 5 English-language).

ASSOCIATION: None given.

Card 2/2

S/089/62/012/003/005/013  
B102/B108

AUTHOR: Leypunskiy, O. I.

TITLE: Physics of shielding

PERIODICAL: Atomnaya energiya, v. 12, no. 3, 1962, 216 - 229

TEXT: The present article is a review on publications of the last years concerning the main problems of "shielding physics", a term proposed by V. G. Kirillov-Ugryumov. Questions of radiation detection and measurement contamination, and biological problems are discussed. L. R. Kimel' (Atomnaya energiya, 12, no. 3, 236, 1962), V. I. Kukhtevich, B. P. Shemetenko (Atomnaya energiya, 12, no. 3, 204, 1962), Ye. A. Kramer Ageyev, V. P. Mashkovich, I. V. Petryanov, and Yu. V. Sivintsev (Fonovoye oblucheniye chelovecheskogo organizma. M., Atomizdat, 1960) are mentioned. There are 2 figures, 4 tables, and 71 references: 54 Soviet and 17 non-Soviet. The four most recent references to English-language publications read as follows: D. Easterly et al. J. Dairy Sci., 43, 137 (1960); W. Bungo, J. Genetic Japan, 35, no. 7, 205 (1960); Pritchheerd. Conference Monaco, v. 2, Vienna, IAEA, 1960, p. 231; R. Russel et al. Science, 128, 1546 (1958).

Card 1/2



Physics of shielding

S/089/62/012/003/005/013  
B102/B108

SUBMITTED: July 10, 1961

Card 2/2

33969

S/089/62/012/003/007/013  
B102/B108

26.2541  
24.6400

AUTHORS: Kimel', L. R., Leypunskiy, O. I.

TITLE: The gamma radiation field of a monodirectional point source

PERIODICAL: Atomnaya energiya, v. 12, no. 3, 1962, 236 - 237

TEXT: Since gamma radiation sources with arbitrary angular distributions can be considered as superpositions of monodirectional point sources, this new type of elementary source is of great interest. The radiation field

of a collimated gamma beam from Cs<sup>137</sup> or Co<sup>60</sup> was measured in a 90 · 90 · 90 cm water phantom; the beam entered the water in the middle of the tank.

An CJC-5 (STS-5) counter was used as a detector; for direct beam measurements, a scintillation detector and a small CM-25T (SI-2BG) counter were used. Measurements were made at distances of 12, 18, 24, 30, 36, and 42 cm along the beam and at 5, 7, 10, 15, 20, and 30 cm from the beam axis. The distribution curves show two sections: a steep drop at small distances (~1cm) and an almost linear and slow decrease at greater distances. From an experimental analysis, the relation  $E_p(\mu_o h, \mu_o x)$  ✓

Card 1/2

33969

S/089/62/012/003/007/013

B102/B108

The gamma radiation field of...

$= E_0 e^{-\mu_0 h} \mu_0^2 \mu_0 h \int_0^{\sqrt{\frac{2\pi\mu_0 h}{3(B-1)}}} \left( \frac{2\pi\mu_0 h}{3(B-1)} \right)^{1/2} \text{Mev/cm}^2 \cdot \text{sec}$  was obtained which fits the experimental curves with an accuracy of about 10%.  $h$  is the distance along the beam,  $x$  the distance from it,  $\mu_0$  the linear attenuation factor for the primary quanta,  $E_0$  the beam energy (Mev/sec),  $\Phi(z) = e^{-z} - z \int_0^{\infty} \frac{e^{-t}}{t} dt$  is the

King function (tabulated),  $B$  - energy build-up factor for a plane mono-directional source. There are 1 figure and 7 references: 5 Soviet and 2 non-Soviet. The two references to English-language publications read as follows: F. Kirn et al. Radiology, 63 (1), 94 (1954); H. Goldstein, S. Wilkins. US AEC Report. NYO-3075 (1954). ✓

SUBMITTED: October 18, 1961

Card 2/2

ZEL'DOVICH, Yakov Borisovich; RIVIN, Mikhail Abramovich[deceased];  
FRANK-KAMENETSKIY, David Al'bertovich; LEYPUNSKIY, O.I., doktor  
fiz.-mat. nauk, prof., red.; BOGOMOLOVA, M.F., red.izd-va;  
SKOTNIKOVA, N.N., tekhn. red.

[Jet-power impulse of powder rockets] Impul's reaktivnoi sily  
porokhovykh raket. Moskva, Oborongiz, 1963. 189 p.

(MIRA 16:3)

(Solid propellant rockets) (Jet propulsion)

L 2874-63 EWT(1)/EPF(n)-2/BDS AFFTC/ASD/AFWL/SSD Pu-4 IJP(C)  
 ACCESSION NR: AP3002266 S/0089/63/014/006/0577/0579

AUTHOR: Leypunskiy, O. I.; Kimel', L. P.; Panchenko, A. M.

TITLE: Gamma-radiation field of collimated point sources Cs sup 137 and Co sup 60 in iron

SOURCE: Atomnaya energiya, v. 14, no. 6, 1963, 577-579

TOPIC TAGS: gamma radiation, point radiation sources, Cs sup 137, Co sup 60, iron, plane radiation sources, energy buildup factors

ABSTRACT: Measurements have been made of the spatial distribution of scattered gamma quanta in an iron block measuring 16 x 18 x 25 cm from highly collimated point sources Cs sup 137 and Co sup 60 with activities from 1 to 0.55 curie. The geometry of the experimental setup is shown in Fig. 1 of the Enclosures. The block consisted of separate sheets of iron. An SBM-10/gas-discharge counter, with a special screen to reduce energy dependence and provide practically isotropic sensitivity of the counter, served as the detector. The measurements were made at points with h and r coordinates, where h = beam distance from the entrance to the middle, and r = radial distance in the plane

Card 1/2

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ACCESSION NR: AP3002266

2

perpendicular to the beam. For Cs sup 137 the measurements were made at five fixed points: 1.19, 2.56, 3.92, 5.28, and 6.65 (where the numbers represent multiples of the mean free path). For Co sup 60, the values used were 1, 4, and 5. The results are shown in Figs. 1 and 2. A formula (see Formula 1 of the Enclosures) has been derived from data for the Cs sup 137 source for calculating the buildup factor B sub E for a plane collimated source. Within the limits of experimental error, the calculated values of the buildup factor for a plane collimated source in iron at the energies of primary gamma quanta of 0.661 Mev were found to be in good agreement with the experimental data of H. Goldstein and S. Wilkins (US AES Report NYO-3075 (1954)). Similar experiments have been conducted for concrete, aluminum, and lead. "In conclusion, the authors express their appreciation to V. I. Ivanov and V. P. Mashkovich for valuable advice expressed during the review of the work." Orig. art. has: 3 figures and 1 formula.

ASSOCIATION: none

SUBMITTED: 29Sep62 DATE ACQ: 12Jul63

ENCL: 03

SUB CODE: 00

NO REF SOV: 004

OTHER: 005

Card 2/2

L 13332-63 EPA/EPR/EPF(s)/ENT(m)/BDS/ES(s)-2 AEDC/AFFTC/APGC/  
RPL/SSD Paa-L/Pr-L/Pr-L/Pt-L RM/WW/BW-2/JW/JFW/JWD/H  
ACCESSION NR: AP3003856 S/0020/63/151/003/0604/0607

AUTHOR: Bobolev, V. K.; Glazkova, A. P.; Zenin, A. A.; Leydumskiy, O. I. 90  
88

TITLE: Temperature profile in ammonium perchlorate combustion

SOURCE: AN SSSR. Doklady\*, v. 151, no. 3, 1963, 604-607

TOPIC TAGS: ammonium perchlorate, temperature profile, flame temperature, surface temperature, condensed phase, gas phase, pressure effect, burning rate, heat release, heat barrier, heat flow, diffusion, combustion product, catalyst, ammonium perchlorate burning rate, ammonium perchlorate flame temperature, ammonium perchlorate combustion

ABSTRACT: The anomalous combustion pattern of ammonium perchlorate at pressures above 150 atm has prompted a study of the temperature profile of the condensed and gas phases in the combustion process. Flame-temperature measurements were carried out by the method of thin thermocouples developed by A. A. Zenin. Compact samples of ammonium perchlorate were held at a constant pressure within the 30-350-atm range in a nitrogen atmosphere. Simultaneous photorecording of the burning rate and combustion pattern and oscillographic recording of temperature were provided. The recorded oscillograms and derived temperature profiles

Card 1/3

L 13332-63

ACCESSION NR: AP3003856

showed two distinct combustion patterns: a stable one within 40--150 atm and an unstable one within the 160--350 atm. The region of unstable combustion was characterized by temperature fluctuations with a high (up to 500C) amplitude in the gas phase, followed by a leveling off of temperature at about 2700C, which was assumed to be also the temperature at the surface. The surface temperature ( $T_s$ ) was determined either indirectly from the maximum heat release in the condensed phase or directly by a method proposed by P. F. Pokhil (Sborn. Fizika vzry\*va, no. 4, 1955 and no. 2, 1956). The increase in overall heat release with increasing pressure observed within the region of stable combustion was attributed in part to a simultaneous increase in heat release in the gas phase and in part to a change in the mechanism of chemical reactions. The heat release in the condensed phase, and hence  $T_s$ , decreased with increasing pressure and approached the temperature of phase transition within the range of unstable combustion. The existence of a heat barrier (80 cal/g) between the two combustion regions was determined from the identity of the experimental heat release at 150 atm in the condensed phase and the calculated amount of heat required to bring the condensed phase to 270C. Heat absorption in the phase transition might be responsible for the decrease in burning rate which leads to flame extinction. The surface temperature in the 50--150 atm pressure range was found

Card 2/3



L 13332-63

ACCESSION NR: AP3003856

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to be relatively low (300—430°C), which indicates a heat flow and hence diffusion of molecules and free radicals from the flame zone towards the surface. Activated combustion products are assumed to act as catalysts of thermal decomposition on the perchlorate surface. The assumption is extended to the combustion of any condensed system in which heat flows from the gaseous reaction zone toward the surface. The article was presented by Academician Ya. B. Zel'dovich on 9 April 1963. Orig. art. has: 4 figures.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics, Academy of Sciences SSSR)

SUBMITTED: 31Mar63

DATE ACQ: 15Aug63

ENCL: 00

SUB CODE: CH

NO REF SOV: 006

OTHER: 004

Card 3/3

ACCESSION NR: AP4041206

S/0207/64/000/003/0153/0158

AUTHORS: Bobolev, V. K. (Moscow); Glazkova, A. P. (Moscow); Zenin, A. A. (Moscow);  
Leypunskiy, O. I. (Moscow)

TITLE: A study of the temperature distribution in the combustion of ammonium  
perchlorate

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 3, 1964, 153-158

TOPIC TAGS: temperature distribution, combustion rate, pressure effect, flame  
temperature, grain effect, phase change, decomposition, point thermocouple,  
sublimation, condensation, combustion stability, heat liberation, oscillograph  
H 700

ABSTRACT: Studies of the combustion of preheated ammonium perchlorate at below-  
atmospheric pressure show that the combustion rate is limited by the equilibrium  
endothermic decomposition of  $\text{NH}_4\text{ClO}_4$  to  $\text{NH}_3$ , and  $\text{HClO}_4$ . A zone combustion treat-  
ment of burning indicated, however, that the decomposition was exothermic. The  
point thermocouple method, developed by A. A. Zenin (Izucheniye raspredeleniya  
temperatury\* pri gorenii kondensirovannykh veshchestv. Dissertatsiya, Moscow,  
1962) was used in this paper to study the temperature distribution of  
Card 1/3

ACCESSION NR: AP4041206

ammonium perchlorate combustion. Two p-type thermocouples, W+Re (5 and 20%Re) with diameters of 15 and 30  $\mu$  and a thickness of 3.5 and 7  $\mu$  respectively, were used. The 7-mm samples of unfiltered perchlorate (pressed to a density of 1.93-1.94g/cm<sup>3</sup>) were treated over the pressure range 40-350 atmos of nitrogen. The thermocouples were impressed in the samples at a pressure of 3000-3500 kg/cm<sup>2</sup>. Maintaining the pressure for 15-20 minutes produced transparent samples. The temperature distribution was recorded on a loop oscillograph H-700, and the speed and character of combustion were photographed. It was discovered that at the end of combustion there was a temperature fluctuation ( 50 msec and 500-1000C). The flame temperature fluctuation and plateau agreed well with the decreased brightness in the photographs, but complete examination of the oscillogram for unstable burning was not possible. This would require more precise recording of the fluctuation of the burning rate (perhaps with high-speed motion pictures). In some cases the burning was extinguished. Temperature profiles were obtained from 40-350 atm, which showed the presence of 2 combustion schemes for ammonium perchlorate, stable (40-150 atm) and unstable (160-350 atm). Abnormalities were discovered in the relation of the surface temperature and heat liberation (in the condensation phase) to the pressure. Assumptions were made concerning; 1) the variation of the ammonium perchlorate combustion mechanism with the growth of pressure; 2) the qualitative effect of the products passing from the reaction

Card 2/3

ACCESSION NR: AP4041206

zone in the gas phase to the surface by gasification of the condensation phase. An hypothesis was proposed concerning the reason for the decrease in the ammonium perchlorate combustion rate with an increase in pressure above 150 atm. An important discrepancy was established between the kinetic thermal decomposition and the kinetic gasification of perchlorate with combustion. Orig. art. has: 6 figures.

ASSOCIATION: none

SUBMITTED: 15Apr63

SUB CODE: GC

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OTHER: 005

Card 3/3

Card 1/3

where  $\rho$  is the density of the powder,  $f$  is the frequency of the powder and  $\alpha$  is the discharge coefficient.

Comparison of (2) and (3) (at  $n=1$ ) gives

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ACCESSION NR: AP4030789

S/0020/64/155/004/0897/0899

AUTHOR: Leypunskiy, O. I.

TITLE: A possible influence of the diffusion flow of the reaction products from flames upon the decomposition of the condensed phase

SOURCE: AN SSSR. Doklady\*, v. 155, no. 4, 1964, 897-899

TOPIC TAGS: explosive, explosive powder, powder explosive, powder combustion, condensed phase decomposition, nitroglycol, reaction product diffusion flow, flame reaction product

ABSTRACT: It is generally accepted that the Gamma-phase (gaseous phase) takes part in the decomposition of the K-phase (condensed phase) by furnishing a flow of heat with which the requisite mass rate of decomposition is assured. The purpose of this paper is to examine the possibility of another reaction mechanism of which the Gamma-phase effects the decomposition rate of the K-phase, by catalysis of the decomposition reaction in the K-phase with products of the com-

Card 1/3



ACCESSION NR: AP4030789

combustion (among them, active molecules) diffusing from the flames to the surface of the K-phase. Ya. B. Zel'dovich (Zh. E. T. F., nos. 11-12, 498, 1942) has shown that, under conditions of equality of the coefficients of thermal conductivity and diffusion in the gaseous mixture, the concentrations of combustion products and decomposition products on the surface of the powder are equal to:

$$a_r = \frac{T_n - T_0}{T_r - T_0}, \quad a_p = \frac{T_r - T_n}{T_r - T_0}. \quad (1)$$

where  $T_g$  is the powder's combustion temperature;  $T_p$  is the powder's surface temperature;  $T_0$  is the initial powder temperature. It is a natural consequence of this theory that, under conditions where coefficients of thermal conductivity and diffusion are equal along the coordinates at which the transfer occurs, the value of the enthalpy remains constant. Equating the enthalpy values for the gas mixture at the powder surface and in the combustion zone, the following relationship is obtained:

$$a_p q + c_p T_n = c_p T_r. \quad (2)$$

Card 2/3

ACCESSION NR: AP4030789

Then

$$a_p = \frac{c_p (T_r - T_n)}{q}, \quad a_r = 1 - a_p = \frac{q - c_p (T_r - T_n)}{q}. \quad (3)$$

The chemical energy of the gasification products  $q$  is spent for heating the gases from  $T_p$  and to  $T_g$  and a certain  $K$ th part for heating the powder from  $T_0$  to  $T_p$ :

$$q = c_p (T_r - T_n) + Kc (T_n - T_0). \quad (4)$$

The experimentally observed values for  $K$  can be small,  $K = 0, 1$ , for example. Estimations showed that the amount of combustion products at the surface of the burning powder is not negligibly small, and does not contradict the hypothesis concerning their catalytic action. "The author expresses his gratitude to V. B. Librovich for discussion and help in this study." Orig. art. has: 9 equations

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics, Academy of Sciences SSSR)

SUBMITTED: 22May63

DATE ACQ: 30Apr64

ENCL: 00

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NO REF SOV: 004

OTHER: 000

Card 3/3

L 46316-66 EWT(d)/EWT(1)/EWT(m)/T IJP(c) WW/JW/JWD

ACC NR: AP6027959

SOURCE CODE: UR/0020/66/169/003/0619/0621

AUTHOR: Zenin, A. A.; Leypunskiy, O. I.; Margolin, A. D.; Nefedova, O. I.; Pokhil, P. F.

ORG: Institute of Chemical Physics, Academy of Sciences, SSSR (Institut khimicheskoy fiziki Akademii nauk SSSR)

TITLE: Temperature field at the surface of burning gunpowder and combustion stability

SOURCE: AN SSSR. Doklady, v. 169, no. 3, 1966, 619-621

TOPIC TAGS: gunpowder, combustion stability, temperature field, ~~stability criterion~~ *temperature distribution*

ABSTRACT: Temperature distribution at the surface of burning gunpowder H was measured at initial surface temperatures ranging from -196 to 140C and pressures of 1--20 atm. The experimental data were used to determine the values of combustion stability criteria for various temperatures and pressures. Comparison of the experimental results with published theories showed that the Zel'dovich stability criterion (ZhETF, 12, 498, 1942), which was derived on the assumption that the temperature of the powder surface does not change with changing burning velocity and that there is no heat release in the condensed phase, is

Card 1/2

UDC: 541.126+536.462

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ACC NR: AP6027959

valid only at low temperatures. The criterion derived by Istratov and Librovich (Zhurn. prikl. mekh. i tekhn. fiz., No. 5, 38, 1964) and the criterion derived by Novozhilov (ZhPMTF, No. 4, 157, 1965) are valid over the entire temperature range studied. Orig. art. has: 4 tables. [PS]

SUB CODE: 21/ SUBM DATE: 15Nov65/ ORIG REF: 010/ ATD PRESS: 5157/

Card 2/2 *edh*

SOKOLOVA, R.S.; LEYPUS, V.M.

The FM-40 attachment to the SR-4 spectrophotometer used for  
measuring the coefficient of reflection. Opt.-mekh.prom. [25]  
no.3:34-36 Mr '58. (MIRA 11:9)  
(Spectrophotometer) (Reflection (Optics)--Measurement))

LEYRER, R.

Problems of rod insulation of electrical high-voltage rotors. p. 104

(Electrotechnika, Budapest, Vol. 48, no. 3, Mar. 1955)

SO: Monthly list of East European Accessions (EEAL), Lc Vol 4, no. 6, June 1955 Uncl

LEYER, Richard, okleveles vegyeszmernok

Report on the activity of the Laboratory of Insulation Technology, Research Institute of Electric Industry in the past 15 years. Elektrotechnika 57 no.11/12:499-503 N-D '64.

1. Head, Laboratory of Insulation Technology, Research Institute of Electric Industry, Budapest, II., Lovohaz u.39.

KRIVITSKIY, M.Ya., starshiy nauchnyy sotrudnik; LEYRIKH, A.A.; METELKIN, I.D.

Plant producing air-entrained concrete articles in Novosibirsk.  
Stroi,mat. 7 no.5:23-27 My '61. (MIRA 14:6)

1. Nachno-issledovatel'skiy institut betona i zhelezobetona Akademii stroitel'stva i arkhitektury SSSR (for Krivitskiy).
2. Glavnyy inzhener upravleniya promyshlennosti stroitel'nykh materialov Novosibirskogo sovnarkhoza (for Leyrikh).
3. Glavnyy tekhnolog Novosibirskogo otdeleniya proyektного instituta No.2 (for Metelkin).

(Novosibirsk--Concrete plants) (Air-entrained concrete)



LEYRIKH, A.A., inzh. IVANOV, I.A., kand. tekhn. nauk; BALAKHNIN, M.V.,  
kand. tekhn. nauk; KROTOV, A.I., inzh.

Producing clay-ash aggregates in Western Siberia. Stroi. mat.  
10 no.10:33-34 0 '64. (MIRA 18:2)

120

PROCESSING AND PROPERTIES INDEX

Lime-slag slurry. V. E. Likhikh, *Stroitel. Materialy* 1937, No. 12, 29-33. A cement is obtained by mixing slaked lime and granulated slag in the proportions of 1:6.5 to 1:7.0 (by wt.); for unslaked lime the proportions are 1:9.5 to 1:10. The method of production is described in detail. The activity of this slurry is greatly increased by the introduction of chem. catalyst (CaCl<sub>2</sub>) and by-products of a chem. plant contg. 80-84% of CaSO<sub>4</sub> and 8-12% sulfuric acid. Concrete were made from this slurry should be steam-treated at 100° during 12 hrs. or electrically heated at 75-80°. R. R. Stefanowaky

ASAC-11A METALLURGICAL LITERATURE CLASSIFICATION

**CIA-RDP86-00513R0009297200**

LEIRIKH, V. E.		PROCESS AND PROPERTIES INDEX	
20			
<p>Expanding cement. V. E. Leirikh. U.S.S.R. 67,697. Dec. 31, 1946. The cement is obtained by grinding together argillaceous slag, granulated blast-furnace slag, slaked lime, and anhydrite. Sample comp.: argillaceous slag 60, blast-furnace slag 50, slaked lime 10, and anhydrite 10 parts by wt. M. Hosh</p>			
<p>ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION</p>		<p>FROM ROMAN</p>	
<p>FROM ROMAN</p>		<p>FROM ROMAN</p>	

LEYRIKH, V. E.

Cand. Tech. Sci.

Dissertation: "Constructional Properties of Cement A. G." Moscow Order of Lenin  
Chemicotechnological Inst imeni D. I. Mendeleev, 21 Mar 47.

SO: Vechernyaya Moskva, Mar, 1947 (Project #17836)

LEYRIKH, V. E.

LEYRIKH, V. E. Inzhener i ZAVYALOU, I. M. Inzh., BISHNEVSKIY, YE. YE. Inzh.,  
GRINGARZ, R. I. Inzh., ZATSEPIN, K. S. Inzh

Nauchno-issledovatel'skiy institut po stroitel'stvu Ministerstva neftyanoy  
promyshlennosti

RAZRABOTKA I VNEDRENIYE PROMYSHLENNOY TEKHNologii POLUCHENIYA TEPLIZOLYATSION-  
NYKH BEZOBZHIGOVYKA DINATEMOVYKH MATERIALOV

Page 111

SO: Collections of Annotations of Scientific Research Work on Construction, completed  
in 1950. Moscow, 1951

LEYRIKH, Valentin Emil'yevich, kandidat tekhnicheskikh nauk; RATNER,  
Sulamif' Isidorovna, inzhener; UDAL'TSOV, A.N., glavnyy redaktor;  
CHAPLYGIN, D.V., inzhener, redaktor

[Concrete for light petroleum products for nonmetallic reservoirs]

Betony dlia nemetallicheskikh emkosti pod legkie nefteprodukty.

Tema 39, no.1-56-54. Moskva, Akad. nauk SSSR, 1956. 23 p.

(MLRA 10:5)

(Concrete construction) (Petroleum products--Storage)

LENYRIKH, V.B., kandidat tekhnicheskikh nauk; MIRONOV, S.A., professor, doktor tekhnicheskikh nauk, redaktor; MARTYNOVA, M.P., vedushchiy redaktor; POLOSINA, A.S., tekhnicheskiiy redaktor

[Provisional instructions for the selection of concrete resistant to aggressive media] Vremennaya instruktsiya po vyboru betonov, stoikikh v agressivnykh sredakh. Moskva, Gos. nauchno-tekhn. izd-vo neftianoi i gorno-toplivnoi lit-ry, 1956. 49 p. (MLRA 9:11)

1. Moscow. Vsesoyuznyy nauchno-issledovatel'skiy institut po stroitel'stvu.  
(Concrete)



TREPOV, A.P.; RON', F.N.; LEYRIKH, V.E., kand.tekhn.nauk., red.; TRUBINO,  
S.M., red.; LAPTEVA, L.M., red.; DEMIDOV, Ya.F., tekhn.red.

[Making large silicate blocks with slotlike openings] Izgotovlenie  
krupnykh silikatnykh blokov so shchелеvidnymi pustotami. Moskva,  
Otdel nauchno-tekhn.informatsii, 1957. 45 p. (MIRA 12:1)  
(Building blocks)

DESOV, A.Ye., doktor tekhn.nauk, prof.; DMITRIYEV, A.S., kand.tekhn.nauk;  
LEYRIKH, V.E., kand.tekhn.nauk; SUBBOTKIN, M.I., kand.tekhn.nauk.

Durability of buildings made from blocks using local binding  
materials. Stroi.prom. 35 no.7:2-7 J1 '57. (MIRA 10:10)  
(Building materials) (Strength of materials)

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S/191/60/000/010/009/017  
B004/B060

153200

AUTHORS: ~~Leyrikh, V. E.~~ Antonova, I. T., Savvina, Yu. A.,  
Fiskina, R. Ya., Brodskiy, G. S.

TITLE: Properties of Concrete With Furyl Aniline Resin Addition

PERIODICAL: Plasticheskiye massy, 1960, No. 10, pp. 38-42

TEXT: This is a report on the improvement of concrete properties by the polymerization of furyl alcohol with aniline. Aniline is added as a hydrochloride. Furyl alcohol added to the cement suspension (20%), slows down the concrete structure formation; 5%  $\text{CaCl}_2$  are therefore added for an accelerator. The addition of hydrochloride of aniline is varied, depending on the desired concrete properties, between 5 and 100%, referred to furyl alcohol. The resin is formed under liberation of heat. The liquid addition is calculated by the equations generally in use for ordinary concrete. The concrete prepared from different kinds of cement and aggregates with a furyl aniline resin content was tested for its technological properties. An M -116 (I-116) vibrator served for its

Card 1/2

Properties of Concrete With Furyl  
Aniline Resin Addition

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condensation. The following values of compressive strength were found for concrete with a ratio liquid : binding agent (cement plus microfiller) = 0.45: Portland cement of the Belgorodskiy zavod (Belgorod Factory) after 180 days  $314 \text{ kg/cm}^2$ ; Portland cement of type BTU (BTTs) of the Nikolayevskiy zavod (Nikolayev Factory) after 180 days  $370 \text{ kg/cm}^2$ , under evaporation  $376 \text{ kg/cm}^2$ . The resistance to impact amounted after 90 days for BTTs cement to  $5.0 \text{ kg.cm/cm}^3$ , for Belgorod cement  $4.5 \text{ kg.cm/cm}^3$ ; (30-35% more than in ordinary concrete). The coefficient of the bond between concrete and reinforcement ranged between 0.14 and 0.20 (as against 0.10 and 0.15 in ordinary concrete). The chemical stability was tested in Tuymazy petroleum, kerosene, gasoil, mineral oil, marine water, and ground water from Devonian horizons. All samples exhibited good stability over a 6-month testing time. A test for permeability to water (at 70 atm) and A-72 (A-72) gasoline (at 20-25 atm) showed that 6-cm thick concrete remained impermeable for 10-15 days. There are 4 figures and 2 tables.

Card 2/2